First quarter.....	0.68	0.61	0.64	0.48	0.41	0.45	5.76	4.90	5.28
Second quarter.....	0.76	0.62	0.67	0.49	0.43	0.46	5.54	4.87	5.13
Third quarter.....	0.83	0.73	0.78	0.56	0.46	0.51	5.74	5.06	5.24
Fourth quarter.....	0.85	0.75	0.80	0.56	0.50	0.53	5.59	5.04	5.23
Year.....	0.85	0.61	0.72	0.56	0.41	0.49	5.76	4.87	5.22
2000:									
First quarter.....	0.88	0.83	0.82	0.55	0.51	0.51	5.55	5.10	5.18
Second quarter.....	0.85	0.74	0.80	0.53	0.49	0.51	5.16	4.92	5.03
Third quarter (1)....	0.87	0.80	0.84	0.53	0.51	0.52	5.02	4.93	4.98

(1) Through July 31, 2000.

The low level of copper prices in 1999 resulted in lower net sales, operating income, EBITDA and net income for that year. See "Management's Comments and Discussions on GMEXICO's Operating Results and Financial Condition- Operating Results in 1999, 1998, and 1997". If low prices continue or fall further, these effects will persist or be increased. Vis-à-vis the cyclical behavior of metal prices in the international market, GMEXICO may consider curtailing or modifying certain of its mining and processing operations.

From time to time, GMEXICO has entered into hedging transactions to provide partial protection in case of greater future decreases in the market price of metals, and it may do so when it believes the market presents the adequate conditions. The by-product operations will not be effected with speculative purposes. The decisions for each transaction and for the general hedging policies will be made only by theExecutive Risk Committee that is formed by the President of the Board of Directors and by the Chief Executive Officer of Administration and Finance and by the Sub-Director of Risk Management in order to make sure that the risks and benefits have been properly evaluated. *See "Quantitative and Qualitative Information on Market Risks- Risk of Product Prices."*

4. *Tariffs/Railroad Division*

The opening to private investment took place between 1995 and 1997 in the Mexican railroad system, including the public bidding process of securities representing FPN capital stock, holder of the concession to operate the Pacifico-Norte Railroad Line. Tariffs were until then subject to the Freight and Express Service Single Tariff called "TUCE"("Tarifa Unica de Carga y Express). This tariff was the framework to fix railroad freight transportation rates, for each product category and according to the ton - kilometers of shipment. TUCE did not take into account market factors. Over the years, the TUCE raised the basic tariffs, but those increases have generally been under inflation rates. In 1993, after a newly implemented rate increase, FNM started to offer discretionary discounts to high-volume costumers or to certain costumers facing financial or operating difficulties.

Pursuant to Article 46 of the Railroad Services Law, rail carriers are free to set their maximum tariffs based on operating or financial factors deemed relevant, subject only to the following: (i) the tariffs must be estabished according to the freight product segment to be transported; (ii)the tariffs must be representative of maximum rates and be registered with the SCT at least ten business days prior to becoming effective; (iii) the tariffs must be applied on a non-discriminatory basis and equally to all customers; and (iv) if the SCT, jointly with the CFC, find that a tarif is anti-competitive if (a) the only transportation alternative available or economically feasible for the costumer; (b) there are no alternative routes available or substitutes for shipment of the product.

Ferromex can freely determine its tarif rates based on operating costs plus a spread. Since the rates registered with the SCT are maximum rates, Ferromex is free to negotiate the size of any discounts offered to reflect factors such as distance between origin and destination, high-volume shipment, value-added cargo, route selection, customer-supplied cars, special services, and delivery time concessons. Ferromex's policy is to apply rate increases that keep pace with inflation in Mexico. After the artificially low-level tariffs mantained during the period under the government control, Ferromex believes that railroad customers are in general accepting of rate increases that are higher than those to which they were accustomed prior to 1998, because of the service and equipment improvements achieved by the carriers in Mexico. Ferromex may change maximum tariffs registered with the SCT at any time or from time to time with respect to one or more product segments. Ferromex is trying to negotiate dollar expressed rates, particularly in the intermodal and automotive segments, which would permit rate adjustments according to the United States CPI.

b) Financial information by Business Line, Geographic Zone and Export Sales.

1. ***Mining Division***

Sales of Mining Products

The following table shows an analysis by geographic segment of GMEXICO's sales in the years 1998, 1999, and the first sixt months of the year 2000

	Sales in millions of constant pesos as of June 30, 2000		
	June 30, 2000	1999	1998
United States	Ps.9,821.2	Ps.7,008.1	Ps.7,454.3
México	4,564.3	9,613.2	8,118.9
Europe	711.8	879.1	533.2
Asia	105.4	458.6	410.5
Latin America	42.2	120.0	64.8
Total sales and services	**Ps.15,244.9**	**Ps.18,079.0**	**Ps.16,581.7**

Export sales of the mining division correspond basically to the last two years to the exportation of refined products with a higher value added for example copper rods, copper cathodes (copper bars) as well as refined zinc and silver. The principal market for metals produced by GMEXICO are located in the United States. Reported sales for this mining segment during the periods of 1998, 1999, and the first six months of the year 2000 are 50.8%, 48.2%, and 70.1%, respectively, corresponding to export sales.

Cost of Mining Production

Below is a table summarizing the average consolidated cash cost of copper production during each period indicated. GMEXICO's cash cost of production includes all operating costs, costs of purchasing concentrates, treatment and refining charges (which represent monthly allowances or incurred costs on the sale of unrefined products) and freight and other sales costs. By-product credits include the net realized value of zinc, silver, gold, lead, and other by-product sales. Administrative expenses include corporate headquarter overheads. The computation excludes the effects of depreciation and amortization, net financing income (cost) , employee profit sharing and extraordinary items. Each component of GMEXICO's cash cost of production is reccognized in pesos and translated into U.S. dollars at the average exchange rate for the month in which such costs are paid or incurred or, in the case of by-product credits, at the exchange rate on the date the corresponding sales are invoiced.

	Year ended December 31, (U.S. cents per pound of copper)				
	1995	1996	1997	1998	1999
Operating costs	53.5 ¢	58.6 ¢	62.3 ¢	58.3 ¢	58.3 ¢
Costs of purchasing concentrates	15.1	13.8	13.2	11.1	17.0
Treatment and refining charges	15.4	13.4	10.6	8.1	4.3
Freight and other sales costs	4.5	4.9	6.6	6.8	4.4
By-product credits	(62.9)	(50.1)	(53.3)	(50.5)	(27.0)
Administrative expenses	5.7	4.5	4.5	4.8	4.9
Total cash cost of production	**31.3 ¢**	**45.1 ¢**	**43.9 ¢**	**38.6 ¢**	**61.9 ¢**

GMEXICO's cash cost of production has been positively affected in recent years by the growth of its capacity to produce refined copper, which has led to lower third-party treatment and refining charges. The related increase in operating costs has been partly offset by higher productivity. The shut down of the Cananea smelter and the tailing dumps at the end of 1998 also positively affected operating costs.

Cash cost of production is also affected by economic conditions beyond GMEXICO's control. Copper prices affect the cost of purchasing concentrates, and prices for other metals, especially zinc and silver; likewise, they affect the level of by-product credits. Real appreciation of the peso (when inflation exceeds devaluation) also tends to cause operating costs to increase.

Pg. 59 of 142

The production cost of the mining division is made up basically of the workforce which represents 12%, by electric power that is purchased from a decentralized entity named Comisión Federal de Electricidad who by law is the only supplier of this input and represents 12% of the cost, by fuel and hydrocarbons bought from Petroleos Mexicanos Refining, which represents 3.7% of the cost, other materials for the maintenance of equipment, machinery and inputs for the productive process that are mainly provided by the following suppliers: Atlas Copco (mining and drilling equipment) Tamrock, Inc. (mining equipment and drilling bits) Great Western Co. (reactives for the mining process) Baker Hughes, Inc. (bits, pipelines, and stabilizers), Road Machinery Co. (Komatsu Dresser trucks and spare parts for mining trucks).

The increase in 1999 compared to 1998 tax year, was due to an increase in the operating costs arose basically from: (a) the appreciation of the Mexican peso against the dollar, since approximately 50% of the mining inputs are expressed in dollars, (b) the incorporation of Asarco and SPCC's operating costs for the last 44 days of 1999, (c) the ending and restarting of mining operations at Cananea, which affected theoperations of this plant for approximately one month and a half, and (d) the increase observed in the costs of purchasing concentrates required to fill the capacities of processing plants.

The decrease in 1998 in cash cost per pound of copper was due to (a) lower operating costs due to productivity gains and shut-down of the Cananea smelter and tailings dumps, (b) lower treatment and refining charges as the new refinery at La Caridad reached full capacity and (c) lower prices for purchased concentrates. These effects were partly offset by lower credits for products, basically for zinc and gold.

The decrease in 1997 was due to (a) lower treatment and refining charges and (b) higher by-product credits due to higher zinc prices . These effects were partly offset by higher operating costs and costs of sales. The calculation of operating costs does not reflect payments in the fourth quarter of 1997 as part of a settlement of certain conflicts with respect to the purchase of Mexcananea shares from a minority investor.

The cash cost of copper production was affected during 1999 by a decrease in zinc production due to the undergoing yearly scheduled major maintenance, as well as a non-schedule stoppage due to a failure in a transforectifier at the end of 1999 at San Luis Potosí refinery, as well as a decrease in volume sales of precious metals as a result of additional inventory stockpiling for the start-up of the new precious metals plant at La Caridad. Starting on November 17, 1999, Asarco and its subsidiary SPCC's results were consolidated.

2. Railroad Division

Ferromex started operations on February 18, 1998. During the first tax year of operations Ferromex significantly increased its freight volume, obtaining total revenues in this first tax year in the amount of Ps.4,390.5 million with 28.5 million ton cargo transported, which together with the continuous increase of distance covered between origin and destination from 570 to 694 kilometers, generated a 19 billion net ton-kilometer movement, which was 29% higher than the volume transported by FNM in 1997. Likewise, the railroad operation improved considerably during this first operation period, some of these improvements are detailed below. A new transport plan was designed and implemented. This new plan permits to schedule trains and yard services, making a more efficient use of the available resources, cutting down the average delay of trains from 91 to 36 minutes, reducing the demurrage of cars in the yards. more efficiently consuming fuel, which is the principal input of the business, and progressively reducing the incidence of precaution orders for tracks. During this first operation period, Ferromex invested approximately U.S.$ 50 million, mostly in restoring tracks and yards, acquiring tractive equipment, hauling, telecommunications and various computing systems.

Approximately 97% of Ferromex's revenues are originated by railroad services rendered in Mexico and the remaining 3% correspond to revenues from services rendered to cutomers from abroad. 90% of the total revenues correspond to income invoiced in Mexican pesos and the remaining 10% to income invoiced in US dollars. The tables below show the tons-kilometers and the revenues for each and every segment and the total contribution percentage by each segment:

Net Tons/Kilometer

SEGMENT	Year ended December 31,		During the first six months	
	1998 (1)	1999	1999	2000
Agriculture	5,322	6,286	3,097	3,428
Minerals	4,907	6,243	3,207	2,998
Petroleum	1,258	1,925	901	1,045
Fertilizers	712	630	267	280
Automotive	491	347	203	184
Metals	836	790	449	326
Cement	1,888	2,436	1,163	1,256
Chemicals	-	1,175	469	836
Industrial products	3,627	2,858	1,396	1,566
Intermodal		1,013	437	628
Total	**19,041**	**23,703**	**11,589**	**12,548**

Revenues (Millions of constant pesos at June 30, 2000)

SEGMENT	Year ended December 31,		During the first six months	
	1998 (1)	1999	1999	2000
Agriculture	Ps. 1,228.2	Ps.1,350.1	Ps.669.1	Ps.683.0
Minerals	898.9	1,051.0	550.8	472.7
Petroleum	268.4	283.0	140.9	167.1
Fertilizers	160.3	157.4	66.1	85.1
Automotive	186.0	142.2	83.1	78.3
Metals	217.4	210.3	117.7	100.6
Cement	425.6	508.7	252.9	262.6
Chemicals	-	249.6	103.2	158.7
Industrial Products	871.9	664.0	324.0	366.2
Intermodal	-	294.1	121.6	191.8
Passengers	26.4	51.6	26.3	20.4
Car Hire	35.6	136.2	22.9	88.8
Others	71.8	157.6	84.3	29.6
Total	4,390.5	5,255.8	2,562.9	2,704.9
Total without passengers, Car Hire and others	**Ps.4,256.7**	**Ps.4,910.4**	**Ps.2,429.4**	**Ps.2,566.1**

(1) 1998, beginning on February 18.

Railroad services revenues. Total revenues in 1999 were Ps.5,255.8 million, 19.7% higher than Ps.4,390.5 million in 1998, because 1998-tax-year operations started in February 19 of that year.

Agricultural segment. Net income in this segment in 1999 were Ps.1,350.1, 9.9 % higher than in 1998, due to the large participation in the grain import market, which partially helped to offset the operations decrease impact on the domestic market primarily due to the extended draught season and to changes in grains trade, due to the disincoporation of Conasupo (Compañía Nacional de Subsistencias Populares-National Company of Popular Supplies). The revenues in 1998 were Ps.1,228.2 million.

Mineral segment. Net revenues in this segment in 1999 were Ps.1,051.0 million, 16.9% higher than in 1998 due to the transportation of iron ore by Ferromex lines from Manzanillo to Monterrey, which in 1998 were moved through the interlinear system with TFM. The mineral segment revenues in 1998 were for Ps.898.9 million.

Chemical, Industrial and Intermodal segment: Net revenues in these segments in 1999 were Ps.1,207.7 million, 38.5% higher than in 1998, due to intermodal traffic volume increase between Manzanillo and the Valley of Mexico, and between Altamira Port and Manzanillo Port, specifically in the industrial segment, where a substantial increase of beer exportation to the United States occured. Net revenues of the Chemical, Industrial and Intermodal segment in 1998 were for Ps.871.9 million.

Cement segment. Net revenues in this segment in 1999 were Ps.508.7 million, 19.5% higher than in 1998, due to service improvement by sharing the transport market. In 1998, net revenues in this segment were Ps.425.6 million.

Petroleum Segment. Net revenues in this segment in 1999 were Ps.283.0 million, 5.4% higher than in 1998, due to the increase of operations with the CFE and Pemex. In 1998, net revenues of this segment were Ps.268.4 million.

Fertilizer Segment. Net revenues in this segment in 1999 were Ps.157.4 million, 1.8% lower than in 1998. This decrease was due to problems about domestic manufacturing of urea and with some custumers' inventory. In 1998 net revenues of this segment were Ps.160.3 million.

Metal Segment. Net revenues of this segment in 1999 were Ps.210.3 million, 3.3% lower than in 1998, because one of the main costumers reduced its production levels. In 1998, net revenues of this segment were Ps.217.4 million.

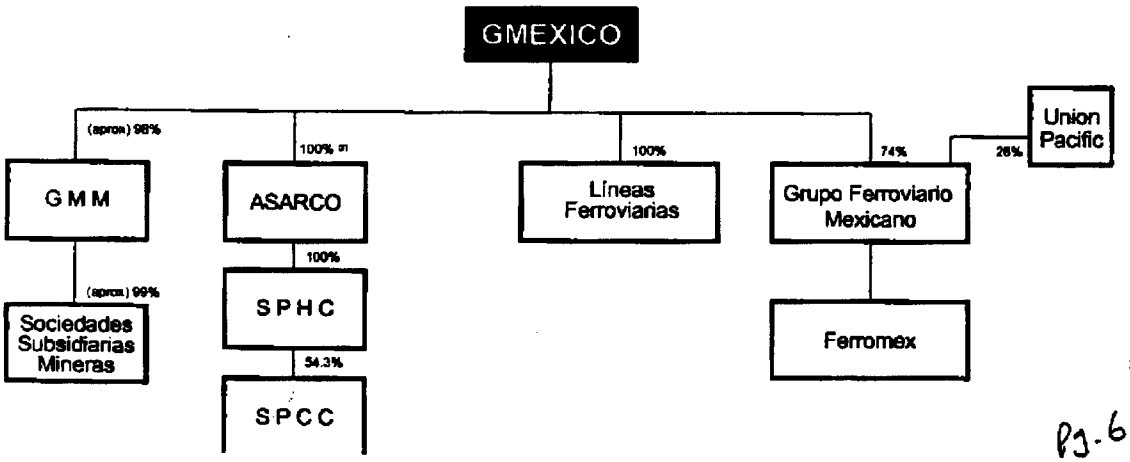
Automotive segment. Net revenues of this segment in 1999 were Ps.142.2 million, 23.5% lower than in 1998, due to the transference of assembly plants in Aguascalientes and Silao, to the short route heading toward the border operated by TFM. In 1998 net revenues of this segment were Ps.186.0 million.

Railroad Operating Cost

The accrued operating cost in 1999 was Ps. 3,606.8 millions, a 28.9% increase with respect to accrued operating cost in 1998, first irregular operating tax year,, in the amount of Ps.2,799.2 million. The operating cost increase in 1999 was derived from a larger maintenance of railroad equipment and infrastructure in 1999 and to the increase in real terms of its main inputs such as diesel and spare parts for train and tractive equipment. Ferromex, when it started its activities in February, 1998, focused on promoting purchases and hiring services which started to standardize equipment maintenance and conservation activities toward the end of 1998. Breakdown of the operating costs for the railroad division is as follows: 33% for the workforce, 12% for the cost of fuel for the locomotives, 12% for the cost representing the maintenance of said locomotives, as well as cars and machinery, 16% corresponding to materials and spare parts for operation, and the remaining 27% is made up of diverse operating costs such as security and surveillance, insurance premiums and terminal and connecting services, etc.

i. Corporate Structure

The present corporate structure of GMEXICO is as follows:



Pg. 62 of 142

GMEXICO is a holding company that is only engaged in activities consisting of (a) holding the capital stock of subsidiaries, (b) holding cash and short-term investments and (c) providing funds to, or receiving funds from subsidiaries engaged in operations or in providing services to other subsidiaries. The three subsidiaries and subholding companies that hold the equity shares of GMEXICO currently operating are (i) GMM, (ii) Asarco, and (iii) GFM.

(i) GMM is a holding company that has no other activity than: holding the capital stock of its mining operating subsidiaries, (holding cash and short-term investments; and provide funds to, or receive funds from, subsidiaries involved in mining operations or in rendering services to other GMEXICO's subsidiaries. GMM's principal subsidiaries are (a) Mexcobre, (and its subsidiaries, the Mexcobre Unit), (b) Immsa and Mimenosa, (and their subsidiaries the Immsa Unit) and (c) Mexcananea, (and its subsidiaries the Cananea Unit).

The Mexcobre Unit, which was acquired from the Mexican Government in 1988, and the Cananea Unit, which was acquired from the Mexican Government in 1990, operate major open-pit copper mines in northwestern Mexico at La Caridad and Cananea, respectively.The Cananea copper mine is one of the largest actively worked copper ore deposits in the world.

Minority investors have an interest of 1.51% of Mexcananea's stock capital and of 3.57% of Mexcobre's capital stock. Other minoritary interests in the GMEXICO's mining division subsidiaries are not relevant. On December 29, 1997 GMEXICO bought in U.S. $ 122 million 15.35% of Mexcananea's stock capital which was formerly owned by a minority investor.

Likewise, GMM controls Saasa, a service company; Mexci, a real estate company; Mexarco and Mimimex two exploring companies; WCS, a purchasing company in the United States, and MMI, a trading company in the United States.

The Immsa Unit mining operations consist of seven underground mines located in central and northern Mexico where zinc, copper, lead, silver and gold are mined, including San Martin, which is the largest underground mine in Mexico, and Las Charcas mine, which is Mexico's largest producer of zinc. Also a copper smelter and a zinc refinery located at San Luis Potosí.The Immsa Unit also operates coal mines and a coke plant to supply a part of the energy requirements of its processing plants.

GMEXICO has metals processing facilities at each of its operating units. In recent years, it has upgraded and expanded its processing facilities to incorporate state-of-the-art technology, to integrate processing capacity in the Mexcobre and Cananea Units, and to increase vertical integration. In 1998, increasing capacity at the Mexcobre smelter allowed GMEXICO to close the Cananea's smelter ahead of schedule in order to avoid environmental pollution and GMEXICO opened a new copper refinery and a new copper rod plant at La Caridad. GMEXICO has completed a new precious metals refinery at La Caridad which allowed GMEXICO to close the old precious metals refinery at Monterrey; and the Cananea Unit has been expanding one of its two SX-EW leaching facilities. The Immsa Unit has its own processing and refining facilities, including a zinc refinery and a copper smelter at San Luis Potosí.

(ii) Asarco. Asarco's operations represent one of the most important mining operations in the United States. Asarco's facilities are located in the southern part of the United States, among which the most outstanding are copper mines at Mission, Ray, Silver Bell in Arizona, and Butte in Montana, the SX-EW plants at Ray and Silver Bell, t zinc mines in Tennessee, a lead smelter in East Helena, a copper smelter in Hayden, Arizona, and a metallurgic complex in Amarillo, Texas, which has an electrolytical copper refinery, a copper rod and copper cake plant, a precious metals refinery, a selenium and tellurium plant and a nickel plant. Asarco also has a 54.2% interest in the operating mines of SPCC in Peru, which consisting of Toquepala and Cuajone open-pit copper mines, the Toquepala SX-EW plant, as well as a mining complexe in the port of Ilo, made up of a smelter, a copper refinery and a precious metals plant.

(iii) GFM is a subholding company which has no other business operations than (a) holding the stock capital of railroad operating subsidiaries, (b) holding cash and short-term investments and (c)

provide funds to, or receive funds from, subsidiaries involved in railroad operations or in rendering services to other GMEXICO's subsidiaries. GMEXICO owns 74% of the stock capital of GFM and Union Pacific through its subsidiary Mexican Pacific. LLC from the United States owns the remaining 26%.

Railroad operations are performed through a GFM subsidiary called Ferromex, which has three concessions from the SCT to operate the Pacific-North, Chihuahua-Pacific, and Nacozari-Nogales lines. In addition, it has trackage rights on the Coahuila-Durango and Querétaro-Saltillo lines, among others.

The railroad line consists of 10,057 kilometers of way, which represents the largest coverage of Mexico's railroad network. The Pacific-North line links Mexico's main cities: Monterrey, Guadalajara, and Mexico City, as well as the Pacific ports: Manzanillo, Mazatlán, Guaymas,; and those in the Gulf of Mexico: Tampico and Altamira. The Chihuahua-Pacific line links the main border cities of the United States with the two most important trading corridors which are: Ciudad Juárez-Mexico City and Guadalajara-Nogales.

At present GMEXICO is undergoing a reorganization process in order to internationalize its mining division. *See "Corporate Reorganization of GMEXICO".*

j. Description of Principal Assets.

I- Mining Concessions and Properties

Under Mexican law, mineral resources belong to the Mexican nation, and a concession from the Mexican Federal Government is to be granted on behalf of private entities to be able to explore for or exploit mineral reserves. The Company's mineral rights arise from concessions granted by *Secretaria de Comercio y Fomento Industrial or "SECOFI"* pursuant to the *Ley Reglamentaria del Articulo 27 Constitucional en Materia Minera* and regulations thereunder. (the "Mining Law"). The current Mining Law, enacted in 1992, simplified procedures for obtaining concessions, extended the term of the concessions from 25 to 50 years and eliminated the maximum interest limit with respect to non-Mexican concessionaires, which was previously 49%. Certain excise taxes previously applicable to mining revenues have also been eliminated.

Mining concessions are granted either for exploration or for exploitation. An expoloration concession permits GMEXICO to explore for mineral resources on a non-renewable six-year term and confers pre-emptive rights when seeking an exploitation concession on the same land. The exploitation concession permits GMEXICO to extract minerals for up to a 50-year renewable period, and it is understood that GMEXICO has to pay a nominal fee thereon and comply with an exploitation program submitted to SECOFI.

Mining concessions grant several specific rights to the concessionaire, including (i) the right to freely dispose of mineral products obtained as a result of the exploitation of the concession, (ii) the right to obtain the expropriation of, or an easement with respect to the land where the exploration or exploitation will be carried out, and (iii) the use of water in the mine to facilitate extraction. In addition, a concessionaire of a mining concession is commited, among other things, (i) to explore or exploit the relevant concession, (ii) to pay any fees imposed upon each of the concessions (iii) to comply with all environmental and safety standards and (iv) to provide information to SECOFI and permit inspections by SECOFI, from time to time.Mining concessions may be terminated if, among other things, minerals being mined are not included in the concession or the obligations of the concessionaire are not satisfied An assignment of mining concessions is only valid, if registered in the Public Registry of Mining.

GMEXICO generally owns the land its concessions relate to, although ownership is not required in order to operate a concession. GMEXICO also owns all of its processing facilities. GMEXICO main offices are located in Mexico City and GMEXICO has sales offices in New York and a purchasing and logistics office in Tucson, Arizona.

(a) Mexcobre Unit Operations

The Mexcobre Unit is currently engaged in the production of copper rod, copper cathodes and copper anodes, with quantities of gold and silver, refined gold and silver, and recovered molybdenum and sulfuric acid. It operates the La Caridad mining complexe, located in the State of Sonora, 22 kilometers southeast of the town of Nacozari de García

and 150 kilometers south of the US-Mexico border. It includes an open-pit mine, a concentrator for copper and a molybdenum recovery, a smelter, a refinery, a copper rod plant, a precious metals refinery, a SX-EW plant a, lime plant, and two sulfuric acid plants. The Mexcobre Unit has completed the construction of a new copper refinery and a copper rod plant at La Caridad, as well as a gold and silver refinery as part of the same complex. The smelter and the sulfuric acid plants are located 23 kilometers from the mine, and the lime plant is located in Agua Prieta, Sonora, 18 kilometers from the United States border. Access is by paved highway and by railroad. The concentrator started operations in June 1979, the smelter in June 1986, the first sufuric acid plant in July 1988, and the SX-EW plant in July 1995; the second sulfuric acid plant started operations in January 1997, the copper refinery in July 1997, the rod plant in April 1998 and the precious metals refinery an mid-1999. The total book value of Mexcobre's property and equipment was Ps.15,990.7 millions as of June 30, 2000 (restated figures in accordance with Mexican GAAP).

The Mexcobre Unit accounted for 36.3% of the net sales, 55.0% of the consolidtated operating earnings, and 26.0% of GMEXICO's total assets as of June 30, 2000.

Geology

The La Caridad deposit is a porhyry copper reservoir typical of those in the Souther basin of the United States. The main rock types that exist prior to the mineralizing processes are driorite, granodiorite, quartz monzonite, and pegmatite in chronological order. Breccia bodies are also found. Alteration and mineralization patterns at La Caridad are comparable to those of other porphyry copper reservoirs in the southwestern United States. Minable copper mineralization is mainly chalcocite, covellite (in a secondary enrichment blanket) and chalcopyrite.

Mining Operations

The Mexcobre Unit uses a conventional open-pit mining method. The ore body is placed within a mountain top, which gives La Caridad the advantage of a relatively low-waste-stripping ratio, natural pit drainage, and relatively short haul distances for both ore and waste. The mining method involves drilling, blasting, loading and hauling of waste and ore to waste dumps and to the primary crushers. Drills, trucks, and shovels are used in the mining process. The mine, originally designed to produce 72,000 metric tons of ore per day, has been expanded to produce 90,000 metric tons of ore per day. An average of 90,394, 91,534, 91,614 and 89,533 metric tons were mined in 1997, 1998, 1999, and through the first six months of 2000, respectively. The average copper content of the ore mined was 0.552% in 1997, 0.563% in 1998, 0.535% in 1999, and 0.504% for the first six months of the year 2000. The stripping ratio at the mine(i.e. the the ratio of wste materials plus leachable ore to ore mined) is currently 1.62 to 1.0. The ultimate pit covers an area of six square kilometers. and it has been designed with 45 degrees maximum slopes, forty 15-meter benches, and a minimum of six months of exposed ore. Mining equipment includes a fleet of twenty-three 170-ton trucks and thirteen 240-ton diesel-electric trucks, four electric shovels with a 16 cubic yard dipper, one electric shovel with a 38 cubic yard dipper, three electric shovels with a 40 cubic yard dipper, five electric drills and one mechanic (diesel) drill, a fleet of bulldozers, road graders , water trucks, and other equipment.

Concentrating Operations

The mine of Mexcobre's concentrator, which started operations in 1979, was designed to process 72,000 metric tons of ore per day. It has undergone several modifications and has a current capacity of 90,000 metric tons per day. Mexcobre uses "Expert" automatic monitoring systems in the concentrator, the crushing plant and the flotation circuit in order to coordinate inflows and optimize operations.

Ore extracted from the mine is processed at the concentrator, which produces a copper-molybdenum concentrate. Concentration consists of crushing and grinding the ore and separating copper-molybdenum ores from waste material by flotation. The copper-molybdenun concentrate is subsequently processed at the molybdenum plant into copper concentrates and molydbenum concentrates. The copper concentrates are sent to the smelter and the molybdenum is sent to several customers for its calcinating. The molybdenum recovery plant has a capacity of 2,000 metric tons per day of copper-molybdenum concentrate. A lime plant was built in 1980 to produce lime from limestone to be used in the concentrating process. The lime plant has a capacity of 340 metric tons of finished product per day.

In 1997, 1998, 1999 and through the first six months of the year 2000, the copper ore processed averaged 91,285, 91,398, 92,071, and 91,633 metric tons per day, respectively, with an average grade of 0.552%, 0.563%, 0.535% and 0.504% of copper respectively and of 0.0433%, 0.0439%, 0.0482% and 0.0424% of molybdenun, respectively. During the same periods, 477,892, 507,975, 505,988 and 235,836 metric tons of copper concentrates

were produced, with average grades of 31.33%, 30.86%, 30.21%, and 29.63%, respectively. The copper recovery was 82.06% in 1997, 84.05% in 1998, 85.34% in 1999, and 83.32% in through the first six months of the year 2000.

Smelting Operations

Copper concentrates are carried by trucks from the concentrator to the smelter, where they are processed and cast into copper anodes of 99.6% purity to be sent to the Mexcobre refinery. Mexcobre's flash smelter technology is from Outokumpu, Finland and it consists of using the exothermic chemical reaction created when copper concentrate sulfurs have contact with oxygen, thereby avoiding a high consumption of fosil fuels. The smelter started up in 1986 with an initial capacity of 180,000 metric tons per year, which was increased to 330,000 tons in March 1997 with the addition of an El Teniente Converter (Chilean technology), and in June 1999, the capacity was increased to 360,000 metric tons per year with the addition of a new vertical furnace (technology bought from Asarco) for the fusion of copper wastes coming from the refinery, and it is expected to increase the capacity to 410,000 tons per year with the addition of a new central burner and ancillary equipment by the end of 2002. Sulfur dioxide gases collected from the flash furnaces and converters are processed into sulfuric acid at two sulfuric acid plants and sold to third parties. The first sulfuric acid plant which started operations in July 1988, has a capacity of 2,650 metric tons of sulfuric acid per day, and the second plant, which started up in January 1997, has a capacity of 2,160 metric tons per day.

Refining Operations

The Mexcobre Unit completed, in July 1997, the construction of a new electrolytic copper refinery at La Caridad. The refinery, which uses the permanent cathode technology developed by Kidd Creek of Canada, reached its maximum capacity of 300,000 metric tons in June 1999. The refinery consists of two halls with 31 sections and 115 polymeric concrete cells with capacity for 58 anodes and 57 cathodes of stainless steel, an AISCO preparation machine, two Aisco cathode stripping machines, an Aisco copper slime treatment machine, and ancillary equipment to produce grade "A" copper cathodes of 99.99% purity, anodic slimes are recovered from the refining process and sent to the slimes treatment plant where additional copper is extracted. The slimes are then filtered, packed and shipped to the La Caridad precious metals refinery to be treated in order to produce refined silver and gold.

Precious Metals Plant

Mexcobre has a precious metals plant operating as part of the La Caridad Complex. This plant has an hybrid technology where the hydrometallurgic section has Cobre-HG Mexican technology, the pyrometallurgy area with a Kaldo type fusion furnace and the Gold and Silver Refinery with technology from Boliden, Sweeden, which operations started in July 1999, and with an annual production capacity of 2.8 tons of gold and 490 tons of silver both of 99.99% purity.

Copper Rod Plant

A new rod plant at the Mexcobre Unit was completed in April 1998 and reached its maximum expanded annual capacity of 150,000 metric tons in May 1999. The plant is producing 8-mm. copper rods of Magnet, Multiline, and Standard quality with a purity of 99.99%.

SX-EW Facilities

Over the years, approximately 186 million metric tons of ore have been extracted from La Caridad open-pit mines with grades between 0.10% and 0.32% sulfide copper. With an average grade of approximately 0.25% copper, this ore cannot be processed economically using the conventional smelting/concentrating/refining process and has been deposited in leaching dumps. In 1995, Mexcobre completed the construction of a new SX-EW facility at La Caridad, which has allowed processing of this ore and certain leachable ore that is currently being mined, resulting in a reduction in Mexcobre's copper production costs. The facility has an annual production capacity of 21,900 metric tons of copper cathodes and has received ISO 9002 certification from the International Standards Organization. The investment was made at a cost of approximately Ps. 346.6 millions, including capitalized interest during the construction period.

(b) Immsa's Operating Mining Units.

Immsa runs seven underground mining complexes located in central and northern Mexico. All of Immsa's mining facilities use conventional mining technology and equipment. All plants and equipments are

in good operating condicitions. The total book value of the Immsa Unit's mining and metallurgical facilities was of Ps.4,706.9 million as of June 30, 2000 (restated according to Mexican GAAP). Each of Immsa's principal mining complexes is described below.

The Immsa Unit accounted for 20.5% and 32.2% of the net sales and consolidated operating earnings of the Company in 1999, respectively, and the 8.5% of the Company's total assets as of June 30, 2000.

Charcas

The Charcas mining complex is located 110 kilometers north of the city of San Luis Potosí, in the State of San Luis Potosí. The complex includes an underground mine and two flotation plants and produces zinc, lead, and copper concentrates, with significant quantities of silver. The Charcas mining district was discovered in 1573, and in the 20th century operations were resumed in 1911. The Charcas mine is characterized by low operating costs and good quality ores, and it is located near the zinc refinery. GMEXICO has increased the mine's production by 32% since 1993, and at present the Charcas mine is Mexico's largest producer of zinc.

The Charcas mining district occupies the east-central part of the Central Basin (Mesa Central) and is part of the Sierra Madre Oriental Metallogenic Province. The dominant mineral structures in the region are folds associated with faults in Mesozoic carbonate rocks. The Charcas mine encompasses the Zacatecas, Taraises and Cupido geological formations, which contain most of the silver, lead, copper and zinc ores. Ore occurs as filling fractures and as replacements at vein walls where limestone strata host rocks are favorable to substitution processes. The economically significant minerals located in the Charcas mines include prirargyrite, argentite, sphalerite, galena, pyrite, and chalcopyrite. The principal mining equipment in the unit includes: 2 Robbins drillers, 7 diamond bit drillers, 72 leg drillers, 8 Jumbo drillers, 1 explosive charger, sixteen 5 and 6 cubic yard scooptrams, four 26-ton trucks, six locomotives with capacities ranging from 6,9,10,15, and 20 tons. The total book value of the Charcas unit property and equipment was Ps. 312.7 million as of June 30, 2000 (restated pursuant to Mexican GAAP).

The Charcas mine uses the hydraulic cut-and-fill method and the room and pillar mining method with descending benches. The broken ore is carried to the underground crusher station. The crushed ore is then hoisted to the surface for processing in the selective flotation plants to produce concentrates. The combined capacity of the flotation plants is 4,500 metric tons of ore per day. 1,446,142, 1,480,878, 1,338,444 and 716,235 metric tons were mined in 1997, 1998, 1999 and through the first six months of the year 2000. The lead concentrate produced at Charcas is sold to third parties in Mexico. The zinc and copper concentrates are treated at the San Luis Potosí zinc refinery and copper smelter.

Santa Barbara

The Santa Barbara mining complex is located 25 kilometers southwest of the city of Hidalgo del Parral in southern Chihuahua and includes three main underground mines and a flotation plant that produces lead, copper and zinc concentrates, with important quantities of silver. Gold-bearing veins were discovered in the Santa Barbara district in 1536. Mining activities in the 20th century resumed in 1913.

The regional geology of the Santa Barbara mines consists of Cretaceous shales and interbedded limestons of the Parral Formation. The majority of zinc, copper and lead ore produced at Santa Barbara come from quartz veins filling fractures previously existng in the lutite and andesite rocks with dips of 50 degrees to 90 degrees. The zinc and lead content of the ore tends to decrease with depth while copper content in general increases with depth. Minerals formed at the Santa Barbara mine include sphalerite, marmatite, galena, chalcopyrite, and tetrahedrite. Gangue minerals include quartz, pyrite, magnetite, pyrrhotite, arsenopyrite, and fluorite.

The principal mining equipment at the unit include: three Robbins drillers, eight diamond bit drillers, 126 leg drillers, 10 drilling equipment (jumbos , simbas and rock drills) one bulldozer (5.2 m3/hr), 43 scooptrams with capacity ranging from 1 to 6 cubic yards, 18 locomotives with capacities ranging from 3.5 to 5 tons. The total book value of the properties and equipment of the Santa Barbara unit was Ps.562.7 million as of June 30, 2000 (restated pursuant to GAAP).

The mining operations at Santa Bárbara are more diverse and complex than at any of GMEXICO's other mines, with veins that aggregate approximately 20 kilometers in length. Each of the three underground mines has several shafts and primary crushers. Due to variable characteristics of the ore bodies, four types of mining methods are used: shrinkage stopes, long-hole drilled open stopes, cut-and-fill stopes and horizontal benching stopes. The ore, once crushed, is processed in the selective flotation plant to produce concentrates. The flotation plant had a capacity of 4,800 metric tons of ore per day, and this capacity was increased to 6,000 metric tons of ore per day in April 1998. 1,405,940, 1,639,785, 1,748,250 and 866,265 metric tons of ore were mined at the Santa Barbara mine in 1997, 1998, 1999, and through the first six months of the year 2000, respectively. The lead concentrate produced is sold to third parties in Mexico. The copper concentrates are treated at the San Luis Potosí copper smelter, and the zinc concentrate may be either treated at the zinc refinery in San Luis Potosí or exported.

San Martin

The San Martin mining complex is located in the municipality of Sombrerete in the western part of the State of Zacatecas, approximately 100 kilometers southeast of the City of Durango. Access is by paved road. The complex includes an undergrund mine and two flotation plants and produces copper, lead and zinc concentrates, with significant quantities of silver. The mining district in which the San Martin mine is located was discovered in 1555. Mining operations in the 20th century resumed in 1949.

San Martin lies in the Central Mesa between the Sierra Madre Occidental and the Sierra Madre Oriental. The Mesa Central consists of Cretaceous carbonate sequences with interbedded chert and shale deposits overlain by Tertiary volcanic rocks of the Sierra Madre Occidental. The principal sedimentary rock formation in the San Martin district is the Upper Cretaceous Age Cuesta del Cura limestone, which consists of an interlayered sequence of shallow marine limestrone and black chert, overlain by shale and fine-grained clayed limestone. San Martin's mineral deposits are of three types: (i) veins; (ii) replacement ore bodies of Metasomatic origin associated with veins; (iii) sedimentary strata. The most important mineral deposits of San Martín are replacement veins and bodies found in the Cerro de La Gloria granodiorite intrusion. An Extensive zone of tactites west of the Cerro de La Gloria intrusion hosts the San Marcial, Ibarra, Ramal Ibarra, and Gallo-Gallina veins. The replacement bodies and veins are comprised of chalcopyrite, sphalerite, bornite, tetrahedrite, native silver, arsenopyrite, pyrrhotite, stibnite, and galena. Tactite deposits are dispersed throughout layers that alternate with barren chert beds without metallic values. The principal mining equipment at the unit are: 2 Robbins drillers, 9 diamond bit drillers, 126 leg drillers, 10 Jumbo drillers, 9 scooptrams which capacity ranging from 6 to 8 cubic yards, two tractors, seven 14 to 24 ton trucks, eighteen 3.5 to 5 ton locomotives. The total book value of the San Martin unit properties and equipment was Ps.536.4 million as of June 30, 2000 (restated according to GAAP).

The horizontal cut-and-fill mining method is used at the San Martin mine. The broken ore is hauled to the underground crushing station. The ore is then brought to the surface and fed to the selective flotation plants to produce concentrates. The flotation plants have a total capacity of 5,800 metric tons of ore per day. 1,792,271, 1,860,483, 1,892,649, and 741,960 metric tons of ore were mined in 1997, 1998, 1999, and as of June 30, 2000 (restated according to GAAP).

The lead concentrate is sold to third parties in Mexico. The copper concentrate is treated at the San Luis Potosí copper smelter and the zinc concentrate may be either treated at the San Luis Potosí zinc refinery or exported.

Santa Eulalia

The Santa Eulalia mining complex is located in the municipality of Aquiles Serdan, in the central region of the State of Chihuahua, 25 kilometers east of the city of Chihuahua.The complex includes two underground mines and a flotation plant that produces lead and zinc concentrates, with important quantities of silver. The mining district in which the Santa Eulalia mines are located were discovered in 1591. Mining activities in the 20th century resumed in 1918. Although Santa Eulalia has one of the richest mineral bodies of all of the Immsa Unit's mines, the cost of operation is high because water must be removed in order to extract the ore.

Santa Eulalia is the largest district of its kind in the intersection of the Laramide-age Mexican Thrust Belt and the tertiary volcanic plateau of the Sierra Madre Occidental. The region contains Jurassic-Cretaceous carbonates which overlie the pre-Paleozoic continental crust. A column of sediments at the base of the Santa Eulalia overlain by calcareous rocks contains most of the mineralized ore bodies in the district. The Santa Eulalia district contains iron, calcium and manganese, as well as lead, zinc, copper and iron sulphides. The mineral deposit is classified as Metasomatic with low temperatures and pressures of formation (Mesothermal), and consists principally of chimeneys and strata. The principal mining equipments the unit has include:: five diamond bit drillers, 68 leg drillers, two jumbo drillers, nine scooptrams with capacity ranging from 2 to 6 cubic yard, four 10 ton trucks. The total book value of the properties and equipment of the Santa Eulalia unit was Ps.299.7 million as of June 30, 2000 (restated pursuant to GAAP).

The Eulalia mining complex consists of the San Antonio and Buena Tierra underground mines. San Antonio generates approximately 90% of the production. The hydraulic cut-and-fill and descending benches mining methods are used at the mines. The selective flotation plant had a capacity of 800 metric tons of ore per day, in January 1998, which was increased to 1,500 metric tons as of April 1998. 217,692; 356,810; 304,953 and 140,746 metric tons of ore were mined in 1997, 1998, 1999 and through the first six months of the year 2000, respectively. The lead concentrate is sold to third parties in Mexico. The zinc concentrate may be either treated in the San Luis Potosí zinc refinery or exported.

Velardeña

The Velardeña mining complex is located in the north-eastern part of the State of Durango, approximately 85 kilometers south-southwest of the city of Torreon in the State of Coahuila and includes two underground mines and a flotation plant and produces lead and zinc. The mining district in which the Velardeña mines are located was discovered in the 16th century. The Velardeña mining complex was operated intermittently from 1890 to 1920 and reopened in 1980.

The Velardeña mining district consists of a series of Cretaceous sedimentary rocks intruded by plutons and dikes of various compositions. The Cretaceous sedimentary sequence is formed by basal limestone covered by siltstone, sandstone, shales and black chert. Andesite and trachyte dikes are also present in the two mines. Mineralization at the Santa María mine is located on a trachyte dike which trends northwest and intrudes limestone beds along the northeast flank of the Sierra Santa María. Zinc ore occurs as fissure fillings, stockworks, dissemination and replacement bodies in the limestone. The minerals in the deposit include sphalerite, marmatite (iron-rich sphalerite), galena, argentite and chalcopyrite. Gangue minerals include calcite, pyrrhotite, pyrite and arsenopyrite. The principal mining equipment this unit has includes: eight diamond bit drillers, 45 leg drillers, one jumbo driller, 14 scooptrams with capacities ranging from 2 to 6 cubic yards, and three 7 and 3 ton locomotives. The total book value of the Velardeña properties and equipment was Ps.39.4 million as of June 30, 2000 (restated figures pursuant to GAAP).

Both mines apply the shrinkage and room and pillar mining methods. The flotation plant has a capacity of 850 metric tons of ore per day. A total of 311,043; 306,869; 290,444 and 147,928 metric tons of ore were mined in 1997, 1998, 1999 and as of June 30, 2000, respectively. The lead concentrate is sold to third parties in Mexico. The zinc concentrate may be either treated in the San Luis Potosí zinc refinery or exported.

Rosario

The Rosario mining complex is located in the southeast of the state of Sinaloa, on the western part of the western Sierra Madre, 100 kilometers east of the seaport of Mazatlán. This mining unit includes the Plomosas underground mine and a flotation plant that produces lead and zinc cocentrates, with significant quantities of gold and silver. The Rosario mines were discovered in the middle of the 16th century. Limited mining activities were conducted intermittently from 1950 until 1989, when large-scale mining began following GMEXICO's development of a flotation process capable of separating and concentrating the lead, zinc, and silver ore compounds. Shortly thereafter, the La Cruz Vein was discovered, Rosario's most significant ore deposit, and has become the center of mining operations at Rosario.

The Plomosas mine is located in the Metallogenic region of the Sierra Madre Occidental and consists of sequences of andesites, rhyolites, tuffs and ignimbrites covering Pre-Cambrian or Paleozoic rocks and Mesozoic sedimentary igneous rocks. The lead, zinc, copper, gold and silver ore bodies are of hydrothermal cavity-filling origin. The mineralization is found in veins, breccias, and stockworks. The principal mining

equipment the unit has are: two diamond bit drills, 27 leg drills, one jumbo drill, eight scooptrams with capacity ranging from 2 to 5 cubic yards, two 8-ton locomotives. The total book value of the Rosario unit properties and equipment was Ps.11.9 million as of June 30, 2000 (restated figures according to GAAP)

The room and pillar mining method with descending benches is applied in the mine. The ore is treated in a selective flotation plant that has a capacity of 600 metric tons of ore per day, producing lead and zinc concentrates. A total of 189,611; 180,884; 187,471 and 94,381 metric tons of ore were mined in 1997, 1998, 1999 and as of June 30, 2000, respectively. The lead concentrate is sold to third parties in Mexico. The zinc concentrate is mostly exported.

Taxco

The Taxco mining complex is located on the outskirts of the city of Taxco de Alarcón, in the northern part of the State of Guerrero, approximately 70 kilometers from Cuernavaca. The complex includes several underground mines and a concentrating selective flotation plant and produces lead and zinc concentrates, with some quantities of gold and silver. The mining district in which the Taxco mines are located was discovered in 1519. Mining activities in the 20th century started in 1918.

The Taxco district lies in the northern part of the Balsas-Mexcala basin adjacent to the Paleozoic Taxco-Zitácuaro Massif. The geology of the Taxco district consists of basement schists overlain by Lower Cretaceous limestone and Upper Cretaceous shales. The ore bodies of Taxco are of three types; (i) ore filling fractures (veins formed from hydrothermal fluids); (ii) replacement ore bodies in calcerous rock; and (iii) stockworks. Fissure veins in the layer of schists, such as the El Cobre vein, contain the most important copper ore deposits. Silver and lead ores are also present in the fissure veins. There are over 40 veins in the Taxco district, 10 of which are currently being mined. The principal mining equipment that the unit has include: five diamond bit drills, 67 leg drills, two jumbo drills, two bulldozers, 27 scooptrams with capacity ranging from 2 to 8.5 cubic yards, six 3.5, 8, and 20-ton locomotives. The total book value of the Taxco unit properties and equipment was Ps.51.4 million as of June 30, 2000 (restated figures according to GAAP)

The shrinkage, cut-and-fill and the room and pillar mining methods are applied at the Taxco mines. The selective flotation concentrating plant has a capacity of 3,300 metric tons of ore per day. A total of 546,404, 537,597, 522,129, and 162,715 metric tons of ore were mined in 1997, 1998, 1999 and as of June 30, 2000, respectively. The lead concentrate is sold to third parties in Mexico. The zinc concentrate may be either treated in the San Luis Potosí zinc refinery or exported.

Immsa Unit Processing Operations

San Luis Potosí Zinc Refinery

The San Luis Potosí electrolytic zinc refinery is located in the city of San Luis Potosí, State of San Luis Potosí. Built in 1982, it is one of the most modern zinc refineries in the world, incorporating state-of-the-art technology. The refinery's cost of production, less than U.S.$400 per metric ton of zinc (U.S.$18.1 cents per pound)after credits for by-products including sulfuric acid and silver, is among the lowest in the world. The total book value of the refinery's properties and equipmet was Ps.1,142 million as of June 30, 2000 (restated according to GAAP).

The plant was designed to produce 100,000 metric tons of refined zinc per year, by treating up to 185,000 metric tons of zinc concentrate from GMEXICO's own mines, mainly Charcas, located only 70 miles from the refinery, and 15,000 tons of zinc oxide. Refined zinc production in 1997, 1998, 1999 and in the first six months of the year 2000, amounted to 102,383, 101,335, 99,576 and 49,306 metric tons, respectively. The refinery produces special high grade zinc (99.995% zinc) and zinc.based alloys with alluminum, lead, copper or magnesium in varying quantities and sizes depending on market demand. In addition, the plant produces as by-products a yearly average of approximately 175,000 metric tons of sulfuric acid, 600 metric tons of refined cadmium, 5,000 metric tons of copper residues and 15,000 metric tons of lead-silver residues.

San Luis Potosí Copper Smelter

The San luis Potosí copper smelter is adjacent to the San Luis Potosé zinc refinery. The plant, which has been in operation since 1925, has gone through several expansion and modernization phases, mostly over

the last ten years. The total book value of the smelter was Ps.232.2 million as of June 30, 2000 (restated according to Mexican GAAP).

The plant operates two blast furnaces (with a third on stand-by), where the incoming materials, primarily copper concentrates and copper by-products derived from lead smelters, are smelted to produce a copper matte. The copper matte is then treated in one of the two Pierce Smith converters, producing an impure copper blister (97.4% of copper), containing approximately two ounces of gold and 300 ounces of silver per metric ton. Of a total copper intake of 30,235 metric tons for 1999, approximately 80% was supplied by the Immsa mines, and the remaining balance was smelted under toll agreements with third parties. Copper blister production in 1997, 1998, 1999, and through the first six months of the year 2000, amounted to 31,458, 33,053, 30,798 and 14,580 metric tons respectively.

Since the materials treated at the smelter contain several impurities (especially lead and arsenic), the facility has been equipped with an arsenic recovery plant for treatment of the dust produced in the blast furnace section. This material contains 35% lead and 20% arsenic which, when treated, produces approximately 2,500 metric tons per year of high purity arsenic trioxide, which is sold in the United States primarily to the wood preserving industry. Approximately 15,000 metric tons per year of lead-bearing calcines (approximately 27% lead) are sold to third parties. In order to comply with Mexican environmental laws, GMEXICO intends to gradually eliminate the San Luis Potosí smelting operations by the year 2004 and consolidate its smelting operations at La Caridad.

Monterrey Refinery

The Monterrey refinery started operations in 1929 and is located in the downtown sector of Monterrey, in the State of Nuevo León. Until 1993, the plant's main activity was the refining of lead bullion. GMEXICO closed the lead refinery in October 1993 following its decision to close its lead smelter in Chihuahua. As a result of the construction of a new precious metals refinery at La Caridad in 1999, GMEXICO ceased operations at the Monterrey precious metals refinery, thereby consolidating its precious metals refining at La Caridad. The unit processed electrolytic slimes containing gold and silver, which were received from two independent Mexican copper refineries that treated part of GMEXICO's production of copper anodes and copper blister. The gold and silver contained in these materials was returned to Monterry in the form of slimes for treatment and recovery of the precious metals. In 1997, 1998, and 1999 the production of refined gold, including toll refining on behalf of third parties was 1,150 kilogrames, 1,781 kilogrames, and 725 kilogrames, respectively and the refined silver production was 240 metric tons, 353 metric tons, and 223 metric tons, respectively. GMEXICO shut down the Monterrey precious metals refinery in December 1999, consolidating its precious metals refining operations at La Caridad.

Nueva Rosita Coal and Coke Complex

The original Nueva Rosita coal and coke complex started operations in 1924. The complex is located in the State of Coahuila, on the outskirts of Nueva Rosita near the Texas border. It comprises an underground coal mine, with an annual capacity of approximately 300,000 metric tons of coal, and a 21-coke oven facility capable of producing 120,000 metric tons of metallurgical coke per year at an average cost approximately 40% below international market prices. The room-and-pillar mining method is employed at the undergound coal mine with continuous miners. The coke-oven facility supplies the San Luis Potosí copper smelter with low cost coke, resulting in a significant cost savings to the smelter. The production surplus (approximately 55,000 metric tons per year) is sold to third parties in northern Mexico. As of June 30, 2000, the total book value of the complex's properties and equipment was Ps. 353.3 million (restated according to GAAP). The complex includes a coal washing plant that started up in 1998, with a capacity of 550,000 metric tons per year and produces cleaner and better quality coal. In Addition, GMEXICO increased the capacity of the underground mine to 250,000 metric tons per year and developed an open pit mine with a capacity of 768,000 metric tons per year. These additions to capacity were completed in 1999 and became operational in 2000.

The New Zinc Refinery

GMEXICO intends to construct a new zinc refinery at the Immsa Unit, subject to identification of an appropriate location and certain other conditions. See "*Development and Capital Expenditure Plans.*"

(c) Cananea Unit Operations

The Cananea Unit is engaged in the production of copper concentrates and copper cathodes. It runs the Cananea mining complex, located 112 kilometers from La Caridad and 60 kilometers south of the Arizona border on the outskirts of the town of Cananea. The mining complex includes an open-pit mine, a concentrator and two SX-EW plants. Access is by paved highway and railroad. The Cananea deposit is one of the world's largest porphyry copper reservoirs. The total book value of the Cananea Unit's property and equipment was Ps.6,507.7 million as of June 30, 2000.(restated according to GAAP)

The Cananea Unit represents 2.8% of GMEXICO's consolidated sales; with regard to GMEXICO's operating earnings, Cananea represented a Ps. 329.4 million loss in 1999; it also represents 9.1% of GMEXICO's total assets as of June 30, 2000.

Geology

The Cananea mine is unusual in that the copper grade increases in deeper strata,, unlike most copper deposits which show a decline in quality in the deeper parts. The Cananea region is within the beginning of the southern mountain range that covers southern Mexico up to northwestern United States. Geological and structural features in the district setting are representative of large copper deposits of the disseminated prophyry type.The district lies within the Basin and Range Metallogenic province. A series of Paleozoic sediments from Cambrian to Carboniferous, lithologically equivalent to a section in southeastern Arizona, overlie a Pre-Cambrian granitic basement.

Mineralization occurred in several stages. Firstly, an early pegmatitic state, associated with bornite-chalcopyrite-pyrite-molybdenite assemblage in breccia pipes. It is followed by a widespread flooding of hydrothermal solutions accompanying extensive quartz-pyritic-chalcopyrite mineralization. A distinct pyrite-quartz stage envelopes and closes the primary sequence. Extensive and pervasive feldspar destructive sericitic and argillic alteration events are evident throughout the district's igneous rock complex.

Mining operations

Cananea uses a conventional open-pit mining method. In recent years the Cananea Unit has invested in equipment to improve stripping capacity. An average of 304,788; 321,641; 266,489 and 281,637 metric tons of material were moved daily in 1997, 1998, 1999, and the first six months of the year 2000, respectively. The stripping ratio (leachable waste/ore) is currently of 3.2 to 1, the copper grade in 1999 was approximately 0.495% and 0.520% for the first six months of 2000. The mine equipment includes: 11 gyratory drills, a fleet of four 260-ton trucks, twenty 240-ton trucks, and twenty-six 170-ton trucks; in the near future, five 360-ton trucks, one 56-cubic yard shovel, two 40-cubic yard shovels, one 36-cubic yard shovel and five 30-cubic yard shovels will be incorporated to operations.

Concentrating operations

Cananea's current concentrator was constructed in 1986; initially, the concentrator had a capacity of 62,500 metric tons of ore per day, which was increased to 80,000 metric tons in May 1998. An average of 67,044; 68,925; 65,997 and 67,478 metric tons of ore were processed daily in 1997, 1998, 1999, and the first six months of the year 2000, respectively. A total of 430,165, 385,622, 329,302 and 199,163 metric tons of copper concentrates were processed during the same periods, respectively, with average grades of 25.44%, 27.46%, 25.70% and 25.90% of copper, respectively. The copper recovery was 81.39% in 1997, 82.99% in 1998, 81.74 in 1999, and 80.81% in the first six months of the year 2000. Currently, the copper concentrates are sent to the Mexcobre smelter at la Caridad for further processing.

The New Crushing System

The Cananea Unit new leachable low-grade ore crushing system was built during 1997 and completed in the beginning of 1999. This system improves the metallurgical recoveries and reduces the operating cost.

Smelting Operations

Prior to discontinuing the smelting operations at the Cananea Unit, in February 1999, the smelting had an annual capacity of 60,000 metric tons of copper blister. In 1997 and 1998, the annual production was 60,669 and 49,592 metric tons of copper blister, respectively. The smelter ceased operations in 1999, subsequent to the termination of an illegal stoppage as part of covenants agreed upon with the Union to restart operations again.

SX-EW Facilities

The Cananea Unit operates a leaching facility and two SX-EW plants All copper ore with a lower grade than the mill cut-off-grade (0.4%), but higher than 0.15% copper, is delivered to the leaching dumps. A cycle of leaching and resting was developed during approximately five years in order to achieve a 56% recovery. The Cananea Unit currently maintains 160 million cubic meters of copper impregnated leach solution in the old Cananea pit with a concentration of approximately 1.0 grams per liter. The SX-EW facilities have a total capacity of 33,200 metric tons of copper cathodes per year. The copper cathode production was 26,840; 28,064; 28,729, and 16,840 metric tons in 1997, 1998, 1999, and in the first six months of the year 2000, respectively. Given the quantities of ore reserves available for leaching, GMEXICO intends to expand the Cananea Unit in order to increase SX-EW production to 54,800 in the year 2000, and 84,400 in 2003. In 1998, the SX-EW facilities at Cananea received ISO 9002 certification from the International Standards Organization.

(d) Asarco

Asarco is one of the world leaders in copper production. In 1999, Asarco's participation in copper mineral production was 1.0 billion pounds, that is, 4.9% of the copper mineral production in the Western World.

Asarco's copper business includes integrated copper operations in the United States, which was 65% of its 1998 production, and an integrated copper business in Peru, conducted through SPCC. The copper business in North America includes the Mission and Ray mines in Arizona; a zinc mine in Tennessee, a copper smelting plant in Hayden, Arizona; a copper smelting plant in El Paso, Texas; a lead smelting plant in East Helena, and a copper refinery in Amarillo, Texas. Operations at the smelting plant in El Paso were suspended for three years in 1999. Asarco is also the owner of 49.9% of Montana Resources Incorporated MRI, a molybdenum and copper mine in Butte, Montana, and of 75% of a copper mine in Silver Bell, Arizona. The Peruvian copper business of GMEXICO, operated by SPCC, includes the Toquepala and Cuajone mines, the copper smelting plant and the copper and precious metals refineries in Ilo, located in the southern part of Peru.

Asarco's copper production in 1999 was 3.3% higher than in 1998. In North America, a complete production year at the Silver Bell mine, which started its operations in July, 1997, and the introduction of a new acid curing process at the Ray mine, a solvent extraction-electrowinning operation (SX-EW), resulted in a 6 million pound increase in the SX-EW low-cost copper production, close to 40% more than that of the previous year. A greater number of tons of extracted mineral, higher mineral grades and better recuperations in the sulphide operations at Mission, Ray and Montana Resources, contributed to the 1998 production.

At the beginning of 1999, Asarco suspended operations for a period of three years in El Paso, due to the fact that smelting and refining market conditions dropped to levels that made such purchases non-profitable. The same market conditions allowed Asarco to sell its own excess production of concentrates, which was carried out in el Paso in favorable terms. During the operation suspension of the El Paso smelting plant, permanent maintenance shall be conducted to allow its return to normal operation at the end of the three year period.

Asarco's participation in refined copper production decreased 183.3 million pounds in 1999, mainly due to the shortage of rolled copper supply for the Amarillo refinery. The suspension of operations at the El Paso smelting plant resulted in new decreases at Amarillo, in an additional quantity of 184.5 million pounds of copper in 1999.

Expansion in Low-Cost Copper

Asarco is taking advantage of its large mineral reserves to expand its low-cost copper production in the U.S.A. and Peru. Asarco's participation in extracted production of more than one million pounds in 1998, increased

10% in 1999. Thus, Asarco changed the distribution of its higher-cost sulphides to the lower-cost SX-EW production of low-cost sulphides.

Mission Complex

The Mission Complex is located 30 kilometers from Tuscon, Arizona. Asarco started operations at the Mission complex in 1961. In the course of time, the adjacent Eisenhower, Pima and San Javier Sur mines were acquired and incorporated as separate mines, but they are now part of the same cut, which is now 2.4 kilometers wide and 3.2 kilometers long. Together with the neighboring mine of San Javier Norte, the Mission complex has an approximate annual production capacity of 114,000 metric tons of contained copper. The cuts are formed by 12 meter high banks, which allow for selective mining operation and greater ease in mineral transportation. The extraction equipment mainly consists of three electric shovels with scoops which vary in size from 46 to 60 cubic yards, five 28 cubic yard shovels, six electric drills, one diesel-electric drill, one diesel-hydraulic drill, nine 320 ton trucks, eight 240 ton trucks,twenty 200 ton trucks and two 170 ton trucks.

In the concentrating area, the primary, secondary and tertiary processes of the crushers reduce the ore size from 5 feet down to three quarters of an inch. The ore is then combined with water and earth to obtain a dust consistency through a milling process, by means of a series of bar and ball mills. The product of this process is sent to the flotation process, where it is combined with biodegradable reactives, as well as with air injection. The reactives cause the separation of metallic particles, which adhere to the bubbles formed by injected air and float to the top, where they are separated and sent to the filtering process in which the copper concentrate is obtained, with an approximate copper content of 28%. The sterile material is deposited at the bottom of the basins, and it is discharged to the tailing dams by means of water. The copper concentrate is sent to the copper smelting plant. 80% of the water used in the process is recycled. In 1999 and during the first six months of 2000, 82.3 and 28.4 metric tons of ore, respectively, were extracted.

Ray Complex

The Ray mining complex is located between the cities of Tucson and Phoenix, Arizona, and it is made up of an open pit mine, two concentrating plants, a SX-EW plant and the Hayden smelting plant. Asarco acquired the Ray mine at the end of 1986 and it has increased its capacity since then. The Ray mine contains copper sulphides and copper oxides. Copper sulphides are mined and milled to produce copper concentrates in the same manner as described for the Mission complex. At the Hayden concentrating plant the ores are treated in the conventional way using bar and ball mills, and at the Ray concentrating plant, which started its operations at the beginning of 1992, semi-autogenous pulverization technology is used. A crushers system within the mine and a conveyor belt system completed in 1991, provide the copper sulphide ores for both concentrating plants. In 1999 and during the first six months of 2000, 74.0 and 39.8 million metric tons of ore, respectively, were extracted.

Copper is also obtained from the copper oxides from the Ray mine and from low-grade ore, and for their recuperation the heap and leaching weirs methods are used. A diluted solution of sulphuric acid is used to generate a copper charged solution, which is treated at the SX-EW plant to produce refined copper cathodes. The annual capacity of the SX-EW plant is approximately 41,000 metric tons of cathodes. During 1999 and the first six months of 2000, 40,154 and 16,979 metric tons, respectively, of cathodes, were produced. The extraction equipments consists mainly of five electric shovels with scoops the size of which varies from 41 to 56 cubic yards, a 15 cubic yard electric shovel and 37 diesel-electric 240 ton trucks.

Montana Resources

In 1989, Asarco acquired 49.9% of the capital stock of GMEXICO Montana Resources, which is the owner of an open pit mine and a concentrating plant located in Butte, Montana. The mine is 2.4 kilometers long by 100 meters deep. The ore from this mine is treated in a conventional way and it has an annual production of approximately 45,000 metric tons of copper content, and approximately 3,600 metric tons of molybdenum content. The concentrate produced is sold to third parties. During 1999 and the first six months of 2000, 27.6 and 16.5 million metric tons of ore, respectively, were extracted. The extraction equipment mainly consists of twenty-three 170 ton diesel-electric trucks, three 15 cubic yard electric shovels and one 28 cubic yard electric shovel.

Silver Bell

This property, located in Arizona, was acquired by Asarco in 1915, and it was operated as an underground mine up to 1954, when it was developed as an open pit mine. Since 1984 the copper grade diminished and, therefore, its exploitation was not profitable, in view of which, since that date, only 1,700 metric tons of cathodic copper were produced by precipitation. In 1996, the construction of a new SX-EW plant with an annual production capacity of 18,000 catodes was started. Mitsui & Co acquired 25% of the ownership of this property. The estimated leachable ore reserves of this mine are 197 millions tons, containing 784 million pounds of recoverable copper. There are two pits at this mine and a third is being excavated. The copper is obtained from copper oxides and for their recovery the heap and leaching weirs methods are used. A diluted sulphuric acid solution is used to generate a copper charged solution which is treated at the SX-EW plant to produce refined copper cathodes. During 1999 and the first six months of 2000, 20,701 and 9,282 metric tons of cathodes, respectively, were produced. The main equipment of this mine consists of four shovels with scoops the sizes of which vary from 18 to 20 cubic yards, and eight 170 ton trucks.

Tennessee Zinc Mines

Asarco operates the Immel, Young New Market and Coy underground zinc mines, as well as two concentrating plants located close to Knoxville, Tennessee. Asarco acquired these properties in 1971 from American Zinc Co., which had been exploiting this area since 1911. These mines are located in the Mascot-Jeferson geological district. Zinc sulphate known as sphalerite is virtually the only ore present. The deposit is of a relatively low grade, close to 3%. The mining exploitation of zinc is economically viable, due to the use of efficient extraction methods. Close to 80% of the ore is turned into commercial products, including zinc concentrates, additioned for construction, agricultural lime, etc. During 1999 and the first six months of 2000, 2.0 and 1.1 million tons of ore were extracted, and 89,215 and 46,429 tons of zinc concentrates were produced, respectively. The extraction equipment consists of six Jumbo VCR 150 drills at the Young mine, three diesel-hydraulic drills and one electrical-hydraulic drill at the Coy mine, and five Jumbo drills at the Immel mine, plus a fleet of special trucks for underground mines.

Smelting Plant in Hayden, Arizona

Since its initial construction in 1912, this smelting plant has been expanded and improved. As of date, this smelting plant has an annual processing capacity of 720,000 tons of copper concentrates. The smelting plan uses a instant combustion furnace of concentrates. An oxygen plant produces oxygen for the furnace and the sulphuric acid plant recovers the sulphur dioxide produced during the smelting process. A water treatment plant recovers the water, and it is recycled to the sulphuric acid plant. The copper concentrates arrive at the smelter by railroad, and they are sampled. This plant complies with all the State and Federal environmental regulations. During 1999 and the first six months of 2000, 203,568 and 93,675 metric tons of copper anodes were produced, respectively.

Assayed for determination of metallurgical values, the concentrates are discharged and mixed with silica, after which they are transferred by conveyor belts to the drying chambers, where they are dried and stored before they are introduced to an instant furnace. Oxygen is injected at a 95% purity with which the instant combustion is originated. A liquid rain is produced and the sulphur contained in the concentrates reacts with oxygen to provide the necessary heat to maintain a continuous combustion. As a result of this fusion, the melted concentrate is divided into two layers at the furnace bottom, a lighter layer which is kept on the upper part and which is formed by iron and silica, which is discharged to the furnace, and the lower layer, called "matte", which contains approximately 60% of copper, plus sulphur and iron, which is transferred to the converters, where the sulphur and iron contents are extracted to get a 98.5% pure copper blister. The copper blister is sent to the anode oven for additional treatment, the result of which is a purity increase reaching 99.4%, as well as the anode molding into 825 pound pieces, each. These anodes are shipped to the Amarillo, Texas Asarco refinery, where they are refined to attain a 99.99% purity.

The smelting plant has a large number of environmental controls, in order to decrease and capture process particles and gases. The driers and furnaces are ventilated by secondary bells. The electrostatic precipitators and the sack cases capture and collect the gas particles before they are released. The instant furnace and the converters have primary bells which capture sulphur dioxide; the acids plant processes these gases through settling chambers, electrostatic precipitators, a catalytic converter, heat exchangers and cooling towers, in

order to obtain sulphuric acid. This by-product is sold and used in numerous processes, including the production of fertilizers, water treatment, and in the copper ore leaching process.

The instant furnace processes, the sulphuric acid plant, the production of oxygen, the sulphur dioxide emissions and other processes, are controlled through a central computerized system.

All of the water used at the Hayden plant is recycled. Some additional facilities include a power house, workshops, sulphuric acid warehouses, employee dressing rooms, administrative offices and a medical clinic.

East Helena Lead Smelting Plant

This smelting plant was built by Asarco in 1888, and it has been expanded and its processes have been improved through time. It is presently used to treat lead concentrates from Latin America, including Peru, Bolivia, Mexico, and from many states in the United States. Lead concentrates are received at the smelting plant by boat and railroad, and they are sampled and assayed to determine the metalurgical values. The concentrates are unloaded and mixed with silica and diesel for their sinterization; thereafter, they are transferred by conveyor belts to the sinterization furnace, where they are roasted to produce *sinter*, a material similar to volcanic lava. Later on, the *sinter* is mixed with *coke* and some by-products, and it is melted in an air injection oven. The lead oxide is reduced to liquid lead, which flows to the lower part of the furnace, where it is separated into slag and *"bullion"*. The *"bullion"* lead, which contains other metals, such as copper, gold and silver and a small antimony, bismuth and tin quantity, is transferred to *dross* containers. *Dross* and copper rise to the upper part of the container by cooling. The *Dross* is separated and the *bullion* lead is treated to take away other metals, then it is molded and shipped for sale. During 1999 and the first six months of 2000, this plant produced 63,791 and 32,882 tons of *bullion* lead, respectively.

Amarillo Metallurgical Complex

This metallurgical complex is located in Amarillo, Texas, and it includes a copper refinery, a copper wire rod plant, production plants of various forms of copper, such as "slabs" or "cake" or copper plate "billets", a precious metals refinery and a nickel plant.

The anodes produced at the Hayden smelting plant are sent to the copper refinery, together with those produced by third parties, up to a capacity of 250,000 tons per year. This capacity was increased by raising the density of the current, beside the improvement of the circuit clarifying solution. It is possible to increase production capacity by raising the density of the current even more, which is now being considered, in proportion to complementary raw material availability.

The anodes received at the refinery are suspended in tanks containing sulphuric acid and copper sulphate. An electrical current is sent through the anodes and the chemical solution to produce anodic copper with a 99.99% purity. Other impurities (including gold and silver) settle at the bottom of the cells. During 1999 and the first six months of 2000, this plant produced 318,685 and 158,939 metric tons, respectively, of copper cathodes. The silts recovered from the above mentioned process are sent to the precious metals refinery within the same complex where, together with the gold and silver scrap, they are processed and refined electrolytically. The refinery has a production capacity of 600,000 troy ounces of gold and 40 million ounces of silver. During 1999 and the first six months of 2000, 21,698,663 and 8,832,359 ounces of silver, and 166,700 and 57,071 ounces of refined gold, respectively, were produced. This complex also has a copper wire rod plant and a copper plate plant, which consists of a furnace to remelt the cathodes and inject them into continuous molding processes to obtain copper wire rod, with an annual capacity of 300,000 tons, and during 1999 and the first six months of 2000, 205,524 and 110,905 tons, respectively, were produced. The copper slab plant has an annual capacity of 150,000 tons, and during 1999 and the first six months of 2000, 57,532 and 43,313 metric tons were produced.

Additionally, this complex has a nickel plant with a production capacity of 710 tons per year. In 1999 and during the first six months of 2000, 445 and 218 tons, respectively, were produced.

Other operations

In addition to the main operations described above, Asarco has various minor processes listed below:

Plant	Product	Capacity (tons)	Production 1999	Prod. 1st. Semester 2000
Globe Omaha, Ne.	Litharge	635	630	209
	Bismuth Oxide	19	19	7
	Bismuth alloys	86	83	30
Encycle Tx.	Nickel	544	145	152

Asarco also has a technical service department specially working on research and development of the most efficient mining processes, as well as a company called Hydrometrics, Inc., which works on environmental protection related processes.

(e) SPCC

The SPCC operations include the mining, milling and flotation of copper containing ores, the smelting of copper concentrates to produce copper blister, and the refining of copper blister to produce copper cathodes.

SPCC also produces refined copper using SX-EW technology. Likewise, it processes silver, molybdenum content and small quantities of other metals as by-products. The silver is sold as an element contained in copper blister, or it is recovered as bars in the refining process. Molybdenum is recovered from the copper concentrate in a molybdenum by-product plant.

Copper production process

The copper production process begins at the open pit mine. In the first place, drilling is conducted, and thereafter the residual rock and the copper-containing ore are blasted; later on, the latter is loaded on diesel-electric trucks by means of electric shovels. The tailings are transported to areas used for this purpose. The copper ore is deposited in wagons and to the crushing circuit, where rotary crushers break up the copper ore into particles not larger than 3/4 of an inch.

Later on, the ore is transported to bar and ball mills that mill it until it acquires a dust consistency. The finely milled ore is stirred in a water and chemical solution and pumped as a mud to a flotation separator. Later, the solution is ventilated, which produces a foam that takes the copper ores, but not the residual rock, to the surface. Then, this foam is extracted and filtered to produce copper concentrates. The residual rocks, called sweepings or tailings, are sent to the tailings warehouse facilities. The copper concentrates (which contain a copper grade of approximately 26 to 28%) are transported by railroad to the smelting plant.

At the smelting plant, the concentrates are mixed with fusing agents. Then, are introduced in furnaces were they are melted, producing "matte" and "slag". The "matte" from air furnaces has an approximate copper content of 35%, and the "matte" from the El Teniente converter has an approximate copper content of 73%. The slag is a smelting process scrap, and it contains iron and other impurities. The "matte" is transferred through ladles to the converters, where it is oxidized in two stages. First, iron sulphides of the "matte" with silica are oxidized to produce a slag that is returned to the air furnaces. Secondly, the copper obtained from the sulphide in the "matte" is oxidized to obtain the copper blister. This copper blister has an approximate copper content of 98.5%. Part of this copper is sold to customers. The rest is transferred to the Ilo refinery.

After an additional treatment in the anodic furnace, the copper is converted into 750 pound anodes and then transported to the refinery's electrolytic tanks. The copper anodes have an approximate copper content of 99.0%. At the electrolytic plant, the anodes are suspended in tanks which contain sulphuric acid and copper sulphate. An electric current is passed through the anodes and a chemical solution to deposit clean copper to make pure copper sheets. The copper cathodes resulting from this process have a 99.99% copper content. The silver and small quantities of other metals contained in the anodes settle to the tank bottom and are recovered separately.

SPCC also produces low-cost copper cathodes at its SX-EW plant. In the SX-EW process, the ore is leached with sulphuric acid to extract its copper content. The diluted acid and copper solution obtained from the

Pg. 77 of 142

leaching operation is stirred vigorously with a solvent that contains chemical additives, which attract the copper ions. Since the solvent is lighter than water, it rises to the surface, taking the copper with it. Then, the solvent is skimmed with an acid solution that releases copper from the solvent. The resulting acid and copper solution is transferred to the electrolytic extraction tanks, where copper is turned into sheets over cathodes, as in electrolytic refining. The SX-MEW process produces copper cathodes ready for their transportation and sale, without any ore crushing, concentration or smelting.

Toquepala Mine

The Toquepala mine is a porphyric copper deposit located at an altitude of 10,000 feet on the flank of the Western Andes Mountain Range, close to the Peru-Chile border. The mineral deposit has been known of since the beginning of the XIXth. century, but the economic feasibility of exploitation of this deposit was not tested until 1952. The mine construction and development were started in 1956, and Toquepala has been in production since 1960.

The Toquepala copper deposit is located on the northwesternly oriented copper belt where the Cuajone deposit is located. The geology of the Toquepala deposit consists of diorite and adjacent volcanic rocks penetrated by igneous rock and faults composed of dacite porphyries. This intrusion activity was followed by a period of intense hydrothermal alteration and mineralization, accompanied by breccia tubes.

There have been several phases of copper mineralization associated with breccia formation and hydrothermal activity periods. The result was that sulphide minerals were deposited in the altered rocks. There is no close relation between the type of rock and the mineralization intensity, in spite of the fact that the highest copper grades appear in the mineral breccia, regardless of the types of rocks that form the breccia fragments.

Inside the breccia column, there are relatively homogeneous, high-grade copper mineralization areas. However, an area within the breccia with a north-south orientation, known as the "confused area", contains high, but erratic copper values. It is hard to predict the copper grades in this "confused area".

The Toquepala mine has, at the present time, a diameter of 1.9 kilometers on its surface perimeter, and is approximately 1,300 feet deep. Operations are conducted in three eight-hour shifts, six days a week. Blast drilling is conducted by two rotary electric drills. More than 95% of the explosives consumption is in the form of ammonium nitrate. The mine has two 80 ton shovels, four 25 ton shovels, fifteen 120 ton mine trucks and eighteen 240 ton mine trucks. Toquepala also uses a railroad to transport the ores from the mine to the concentrating plant. The mine is designed with 35 meter wide sequential push-backs, which is a standard mining method for copper porphyries. The roads are designed with an 8% slope and they are 25 meters wide.

The purchase of new equipment and technology has been going on at Toquepala since 1991 to improve operations. The Toquepala concentrating plant was built between 1956 and 1958 to process 33,000 tons of ore per day, said capacity having been increased to 55,000 tons per day. The ore-crushing capacity was increased in 1996, and it is now performed by one primary crusher, two secondary crushers, four tertiary crushers, eight bar mills, 24 ball mills and 8 ball mills for remilling. It also has 4 OK-100 flotation cells, 3 OK-50 flotation cells, and 8 column cells.

Additionally, in 1962, a molybdenum recovery plant was built. Besides the open pit mine, the crushing and concentrating plants, the Toquepala mine includes maintenance facilities with a capacity to repair the equipment presently used. In general, the equipment used at Toquepala is in good condition. Toquepala has railroad and road communication with Cuajone and Ilo, and the energy is supplied by a power plant at Ilo through a 79 kilometer transmission line. During 1999 and the first six months of 2000, 16,220 and 7,806 thousand tons, respectively, of ore, were extracted.

SX-EW Plant

Since the sixties, SPCC has stored at its properties lowgrade copper material, which is now able to process and produce refined copper cathodes with 99.99% purity, by means of an extraction process with solvents and electrolytic deposition (SX-EW). The SX-EW plant started its operations at the end of 1995. In the third quarter of 1999, the plant expansion was completed to produce 62,000 short tons per year. During 1999 and the first six months of 2000, 49,544 and 29,004 tons of cathodes, respectively, were produced at this plant.

Cuajone Mine

The Cuajone mine is located 24 kilometers north-east of the Toquepala mine and, as the latter, it is a porphyry copper deposit. Its construction and development started in 1969 and the mine has been in operation since 1976.

The Cuajone porphyric copper deposit consists of mineralized rocks of latite and intrusive andesite porphyry, which cut through andesitic and riolitic volcanic rocks. A central breccia body consists of altered and mineralized fragments of volcanic and intrusive rocks contained in a relatively fresh matrix of latite porphyry. The dominant fracture found within the rocks before the mineral, and intrusive therein, is an intrusive transverse fracture caused by the intrusion of latite igneous rock. Superimposed on this intrusive fracture, the intense fault, fracture and cut along the northeast-southeast direction is found. The economic copper mineralization area in Cuajone is typified by its regular shape, the homogeneous grade and a simple mineralogy. Only the central breccia area, with its sterile latite porphyry inclusions, represents important areas of internal residues.

At the present time, the mine is basically circular, with a diameter of approximately 1.9 kilometers, and in most of its parts, with a depth of 1,600 feet. The operations are conducted in three eight-hour shifts per day, six days a week. The blast drilling is performed by four rotatory electric drills.

Loading is performed by two 80 ton shovels, one 60 ton shovel and two 25 ton shovels. The use of transportation by trucks and railroad wagons combines the flexibility and the climbing capability of trucks with the efficiency of long-distance transportation of the railroad. The mine has four 120 ton mine trucks and twenty-seven 240 ton mine trucks. As a part of the capital expenditure schedule, in 1994 the purchase of large electric shovels was started, in order to make them work proportionately with the 240 ton mine trucks. Later on, SPCC has continued with the purchase of larger capacity shovels. These 80 ton shovels have approximately the size of a three-story building, and they need three movements to load a 240 ton truck to transport the ore to the railroad track. The mine is designed to operate in 35 meter wide push-backs. At this time, the roads have 8% and 10% slopes and they are 25 meters wide.

The mine ore is transported by railroad to the primary crusher of the Cuajone concentrating plant, located six kilometers away from the mine. The original capacity of 43,500 metric tons per day of the concentrating plant, was increased to 58,000 metric tons per day in 1995. Later on, during 1998, it was increased again to 87,000 metric tons per day. At this time, the plant has 1 primary crusher, 3 secondary crushers, 7 tertiary crushers, 10 ball mills, 4 ball mills for remilling and 1 vertical mill, as well as 30 OK-100 flotation cells and six column cells.

In 1980, a molybdenum recovery plant was built. Molybdenum is an important by-product at Cuajone. The molybdenite distribution differs from that of copper, in the sense that its grade is very erratic, in spite of the fact that concentrations of high-grade molybdenum are found on the northeast and southwest sides of the mineral area.

Besides the open pit mine, the crushers and the concentrating plant, the Cuajone mine includes facilities for the maintenance of the mining and crushing equipment. In general, the equipment used at Cuajone is in good condition. Cuajone has railroad and road communications with Toquepala and Ilo, and the energy is supplied by a power plant at Ilo, through an 85 kilometer transmission line. During 1999 and the first six months of 2000, 28,608 and 14,696 thousand metric tons of ore, respectively, were extracted.

Ilo Smelting Plant

SPCC's Ilo smelting plant began its operations in 1960. It is located approximately 16 kilometers north of the port city of Ilo and it can be reached by road. In 1976, the smelting plant was enlarged to handle the Cuajone mine production. At the time of the expansion, two new air furnaces and three converters were added. The smelting plant has a conventional design and uses two air furnaces to produce a copper "matte" which is thereafter blown into seven Pierce-Smith converters to produce copper metal. At this time, the smelting plant has a nominal copper blister production capacity of 300,000 metric tons per year. In 1995, SPCC installed a converter called El Teniente, to replace one of the air furnaces, and an oxygen plant to supply enriched air to the new converter.